

## CLAIMS

What is claimed is:

1. A process for sterilizing waste comprising the steps of:
  - 5 providing a pressure vessel encased by a heating jacket and an electronic control system, the vessel having a plurality of paddles carried by a shaft, the paddles disposed along the length of the pressure vessel;
  - 10 loading waste into the pressure vessel;
  - sealing the pressure vessel to allow pressurization of the pressure vessel;
  - 15 providing heat to the heat jacket to heat the walls of the pressure vessel thereby increasing the temperature and pressure inside the pressure vessel;
  - rotating the paddles at a rate of 50 revolutions per minute (RPM) or less such that the waste contacts the heated walls of the pressure vessel;
  - 20 cutting waste entangled or caught on the paddle with a blade;
  - maintaining the increased temperature and pressure inside the pressure vessel while continuing to rotate the shaft, such that the waste is subjected to a temperature and pressure sufficient to sterilize the waste;
  - following sterilization of the waste, reducing the pressure in the pressure vessel to remove moisture from the sterilized waste; and
  - monitoring the pressure vessel during the process with the control system to control the process.
2. The process as in claim 1 wherein the monitoring includes the monitoring of pressure and temperature in the pressure vessel and the controlling of the heat jacket.

3. The process as in claim 2 wherein the temperature is at least monitored at the lowest portion of the pressure vessel.

4. The process as in claim 2 wherein the step of reducing the pressure comprises venting the gas through a vent having a filter for limiting the flow of particulates

5 and further comprising the step of monitoring the flow rate of the gas from the pressure vessel and creating a backflow through the vent to clear the filter.

5. The process as in claim 4 further comprising the step of cooling the gas vented from the pressure vessel prior to discharging the gas.

6. The process as in claim 1 wherein the paddles have blades with knife edges and

10 further comprising a plurality of protrusions carried on the wall of the pressure vessel wherein the protrusion interact than the knife edges of the blade for the step of cutting of waste entangled or caught on the blades. *cl 1*

7. A process for breaking down waste comprising the steps of:

15 providing a pressure vessel encased by a heating jacket and a plurality of paddles extending from a shaft towards the walls of the pressure vessel;

loading waste into the pressure vessel;

sealing the pressure vessel to allow pressurization of the pressure vessel;

providing heat to the heat jacket to heat the walls of the pressure vessel

thereby increasing the temperature and pressure inside the pressure vessel;

20 rotating the shaft at a rate of 50 revolutions per minute (RPM) or less so that the paddles mechanically causes the waste to contact the heated walls of the pressure vessel; and

cutting waste with a cutting edge in the pressure vessel.

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8. The process as in claim 7 wherein the knife edges are located on blades of the paddle.

9. The process as in claim 8 wherein the knife edges interact with protrusions carried by the wall of the pressure vessel in an upper region of the pressure vessel.

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10. The process as in claim 7 wherein the knife edges are carried by the wall of the pressure vessel.

11. A process as in claim 8 wherein:

10 following sterilization of the waste, venting the gas of the pressure vessel through a vent, having a filter that limits the flow of particles out of the pressure vessel, to reduce the pressure in the pressure vessel to atmospheric pressure, while continuing to heat the pressure vessel and while continuing to rotate the shaft, so as to remove substantially all of the moisture from the sterilized waste, the filter limits the flow of particulates out of the pressure vessel.

15 12. The process as in claim 11 further comprising the steps

monitoring the flow rate of the gas from the pressure vessel and creating a backflow through the vent to clear the filter when determine that the filter is clogged; and

20 cooling the gas vented from the pressure vessel prior to discharging the gas.

13. An apparatus for the treatment of waste comprising:

- a substantially horizontally disposed cylindrical pressure vessel;
- a heating jacket surrounding substantially all of the pressure vessel for heating the walls of the pressure vessel;
- 5 a shaft projecting into the pressure vessel driven by a drive mechanism;
- a plurality of paddles carried by the shaft, the paddles being adapted to urge waste in the pressure vessel towards and into contact with the heated walls of the pressure vessel to effect substantially uniform heating thereof;
- 10 a plurality of knife edges and protrusions for working in cooperations for cutting of waste entangled on paddles;
- at least one port for accessing the pressure vessel for the waste, the port capable of being sealed;
- a vent connected to the pressure vessel for reducing the pressure in the pressure vessel to atmospheric pressure; and
- 15 a monitor for monitoring parameters of the apparatus and controlling input to the apparatus for at least a portion of the apparatus so that sterilization is achieved.

14. The apparatus of claim 13 wherein the parameters include temperature in the pressure vessel and pressure in the pressure vessel.

20 15. The apparatus of claim 14 wherein the temperature is monitored by a temperature sensor located in the lower region of the pressure vessel.

16. The apparatus of claim 13 wherein the vent has a narrow area and enlarged area for reducing the velocity of the gas and has a filter for limiting the flow of particulates.

*in  
cl. 13*

17. The apparatus of claim 13 further comprising a vented emission treatment system having a vapor condensing system with a cooling system for condensating at least a portion of the gas into a liquid and the vented emission treatment system having a vapor portion for filter gas.

5 18. The apparatus of claim 13 wherein the paddles each have at least one blade having a knife edge in proximity to the wall of the pressure vessel and wherein the protrusions are carried by the wall of the pressure vessel.  
*in cl. 13*

19. The apparatus of claim 18 wherein the protrusions are carried by the wall of the pressure vessel on the upper region of the pressure vessel.

10 20. The apparatus of claim 13 wherein the knife edges are carried by the wall of the pressure vessel. *in cl. 13*

21. An apparatus for the treatment of waste comprising:  
a substantially horizontally disposed cylindrical pressure vessel;  
a shaft projecting into the pressure vessel driven by a drive mechanism at  
15 a rate of approximately 50 revolutions per minute (RPM) or less;  
a plurality of paddles for mixing attached along the length of the shaft,  
the paddles being adapted to urge waste in the pressure vessel towards and into  
contact with the heated walls of the pressure vessel to effect substantially  
uniform heating thereof;

20 at least one port for the waste capable of being sealed; and  
a plurality of knife edges and protrusions for working in cooperation for  
cutting of waste entangled on the paddles.

22. The apparatus of claim 21 further comprising:

a steam jacket surrounding substantially all of the pressure vessel for heating the walls of the pressure vessel

a vent connected to the pressure vessel for reducing the pressure in the pressure vessel to atmospheric pressure; and

a monitor for monitoring parameters of the apparatus and controlling the thermal inputs and the rotating shaft.

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23. The apparatus of claim 21 wherein the paddles each have at least one blade having the knife edge and in proximity to the wall of the pressure vessel and the protrusion are carried by the wall of the pressure vessel on the upper region of the pressure vessel.

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